BARBEQUE COVER SUPPORT DEVICE

Reference to Related Application

[0001] The present patent application claims priority to U.S. Provisional Application No. 60/216,304, filed November 28, 2000, titled "REMOTE-CONTROL (OPEN & CLOSE) BAR-B-QUE LID BY MECHANICAL COUPLING," the content of which is hereby incorporated by reference in its entirety.

Field of the Invention

[0002] The present invention relates generally to barbecue grills.

Background

[0003] Generally, barbecue grills include an oven-like housing for cooking food on a grilling surface. A heat source, such as burning charcoal or a gas flame radiates heat from beneath the grilling surface directly to the food lying on the grilling surface. A cover over the grilling surface retains heat produced by the heat source. The cover also traps smoke and steam that enhance the flavor of the food being cooked.

[0004] Some covers include a window that allows the cook to monitor the cooking of the food. However, smoke often clouds the window and prevents the cook from visually inspecting the food. Thus, even with the window the cook may sometimes need to open the cover just to check the cooking process.

[0005] The cover provides convenient access to the cooking food, but fully opening the cover allows heat and smoke to escape from the grill. Opening and closing the cover also affects the flow of oxygen within the grill. The rate of combustion for a fuel source depends in part on the amount of oxygen available. The combustion rate in turn affects the grill temperature. A low oxygen level within the grill may also reduce or eliminate fat-fueled fires. The cover is therefore a useful component of a barbecue grill.

[0006] Some barbecue grills do not have a cover, and others provide a cover that is removable. However, there is a need for a barbecue grill that allows a cook to control the size of the opening between the grill and the cover. It is therefore desirable to provide a grill

having a cover with an adjustable opening to control oxygen circulation and retain heat and smoke.

[0007] Barbecue grills that use a combustible fuel source such as charcoal briquettes do not always provide a constant source of heat. When the briquettes are first ignited, very little heat is produced. After the briquettes become fully ignited, a peak temperature is reached. The temperature then gradually declines as the fuel is consumed. The size of the opening between the cover and the grilling surface affects the temperature on the grill, and it is therefore desirable to adjust the cover opening throughout the cooking process.

Summary of the Invention

[0008] The preferred embodiments described below solve these and other problems by providing, in certain preferred embodiments, a control mechanism for adjusting the opening between a cover and the barbecue grilling surface. One of ordinary skill will recognize that the control mechanism may be designed in a variety of ways in addition to the exemplary embodiments provided herein.

[0009] In one embodiment, a barbecue grill comprises a grilling surface, a cover for providing an adjustable opening over the grilling surface, and a motor for opening and closing the cover. The motor is coupled to the cover. The grill may additionally comprise a counterweight attached at the rear of the cover. The motor is removable from the grill. The electric motor may be powered through an AC outlet, or alternatively by battery or solar power.

[0010] A remote control is used to transmit control signals to the motor. In one example, the remote control transmits start and stop signals. In another example, the motor operates while a button on the remote control is pressed and the remote control is transmitting signals. Alternatively the remote transmits open or close control signals. The motor may position the cover at any point within the full range of movement. In yet another example the remote control additionally transmits control signals to control the flow of a combustible fuel.

[0011] A method for controlling the opening of a cover over a grilling surface causes a motor to operate upon receiving a first signal, where the motor is coupled to the

cover such that operation of the motor causes an adjustment in the placement of the cover over the grilling surface. The method causes the motor to stop operating upon receiving a second signal. Activating a first control generates a first signal. Releasing the first control generates a second signal. Alternatively, activating a second control generates a second signal.

[0012] An apparatus for attaching a motor to a cover of a grilling surface includes a motor support beam having an adjustable length. The motor support beam includes a motor attachment surface for attachment to the motor and at least one base attachment surface for attachment to a support base of the grilling surface. A counterweight having an cover attachment surface is attached to the cover of the grilling surface. A coupling rod attaches the motor to the counterweight. Alternatively, a coupling rod for couples the motor to the cover of the grilling surface. The motor support beam comprises a first portion insertable into a second portion. The first portion has a threaded exterior portion, and said second portion has a threaded interior portion, so that the length of said motor beam is determined by turning the first portion with respect to the second position. Alternatively, the motor support beam comprises a spring member that presses the first portion away from the second portion. In yet another embodiment, at least one of the first portion and the second portion has a plurality of holes, the length of said motor beam being determined by inserting a pin through one of the holes. The motor may rest on the motor support beam or suspend from the motor support beam.

<u>Brief Description of the Drawings</u>

[0013] FIG. 1 is a side elevational view illustrating a cooking apparatus incorporating the control mechanism for adjusting the opening of a cover over a barbecue grill.

[0014] FIG. 2 shows a coupling rod for connecting a motor to an adjustable cover.

[0015] FIG. 3 shows a slotted motor attachment arm.

[0016] FIG. 4 shows a motor and receiver assembly.

[0017] FIG. 5 shows a motor mount stabilizer bar.

[0018] FIG. 6 shows an adjustable crossbar support arm.

[0019] FIG. 6A shows an adjustable crossbar support arm having an internal spring.

[0020] FIG. 6B shows an adjustable crossbar support arm with a pin at the end.

[0021] FIG. 6C shows an adjustable crossbar support arm having threaded inserts.

[0022] FIG. 6D shows another embodiment of an adjustable crossbar support arm.

[0023] FIG. 7 shows a counterweight for attachment to the rear of a barbecue grill cover.

Detailed Description of the Preferred Embodiments

[0024] Partially opening the cover of a barbecue grill allows a chef to monitor the cooking process. Even raising the cover as little as an inch or two allows the chef to watch for grease fueled fires and monitor the cooking food. Where the cover is held partially open, the chef can attend to other tasks while still visually monitoring the cooking of the food on the grill.

[0025] Additionally, many grills use wood or wood chips to generate smoke and flavor the food. If the cover is kept closed, there is insufficient oxygen to allow combustion of the wood, and this results in a reduction of smoke for flavoring the food. However, opening the cover allows the wood or wood chips to continue smoldering, and the food receives the desired smoke flavor.

[0026] FIG. 1 shows a cooking apparatus 100 having an adjustable cover 102. The cover 102 is opened and closed by a motor and receiver assembly 400. In the illustrated example, an electric motor drives a slotted motor attachment arm 300 in a clockwise direction. The attachment arm is connected to a coupling rod 200 with swivel connectors. As shown in the exemplary illustration, the coupling rod is connected to a counterweight 700. The counterweight 700 is attached to a rear portion of the cover 102 such that the counterweight 700 extends beyond a pivot point 104. The counterweight 700 offsets the weight of the cover 102 so that the load on the electric motor is reduced.

[0027] FIG. 1 shows the cover 102 in a partially open position. As the motor drives the attachment arm 300 clockwise, the coupling rod 200 rises. This in turn causes the cover 102 to close about the pivot point 104. When the attachment arm 300 runs parallel to

the coupling rod 200, the cover 102 is in the closed position. As the motor continues to operate, the attachment arm 300 continues to rotate. This causes the coupling rod 200 to move downward. The downward movement of the coupling rod 200 acts on the counterweight 700 and forces the cover 102 to open about the pivot point 104. The attachment arm eventually reaches a downward position and is once again positioned parallel to the coupling rod 200. At this point, the cover 102 is in the open position. Continued operation of the motor causes the attachment arm 300 to complete the rotation and the cycle is then started over again. In one embodiment, the motor operates at approximately three revolutions per minute (3 rpm).

[0028] Alternatively, the motor turns clockwise to lower the cover 102 and counter-clockwise to raise the cover 102. Although still feasible, the attachment arm does not need 360° of movement to open and close the cover 102 with this configuration. For example, the grill could be configured to be fully closed when the attachment arm 300 is 45° above level, and fully open when the attachment arm 300 is 45° below level.

[0029] One of ordinary skill will understand that there are various ways of raising and lowering the cover 102. In one alternative, the motor slides a rod up and down to lower and raise the lid. In another example, the attachment arm is connected to a front portion of the cover.

[0030] As shown in the exemplary illustration of FIG. 1, the motor rests on a motor mount stabilizer bar 500. The motor mount stabilizer bar 500 is connected to the cooking apparatus 100 with an adjustable crossbar support arm 600. Alternatively, the motor is mounted in other locations such as directly to a crossbar or suspended beneath the cooking apparatus 100.

[0031] The counterweight 700 is connected using a coupling rod 200 with swivel fasteners that are attached to a slotted motor attachment arm 300. FIG. 2 shows one embodiment of a cylindrical coupling rod 200. One of ordinary skill will understood that the coupling rod 200 may have various shapes.

[0032] FIG. 3 illustrates an example of a slotted motor attachment arm 300. As shown in this example, the motor attachment arm 300 is connected to the armature of an electric motor. As the electric motor operates, the motor attachment arm 300 rotates about

the pivot point 302. The motor attachment arm 300 is connected by placing swivel connectors within the slot 304. The swivel connectors join the motor attachment arm 300 to the coupling rod 200. Placing the motor attachment arm 300 in the down position forces the coupling rod 200 down, which in turn causes the counterweight 700 to move downward. This downward movement of the counterweight 700 at the rear of the cover 102 causes the cover 102 to rotate open about the cover pivot point 104. Similarly, when the motor attachment arm 300 is in the up position the coupling rod 200 does not act on the counterweight 700 and the cover will be in the closed position. Each full revolution of the motor attachment causes the cover 102 to open and close. In one embodiment, the coupling rod 200 is removable from the cover 102 or the motor attachment arm 300 to allow manual opening of the cover.

[0033] FIG. 4 illustrates a motor and receiver assembly 400. As shown in this example, the motor and receiver assembly 400 is constructed so that the motor and electronic components are housed within a weather-resistant enclosure. The electric motor is plugged into an electrical outlet. As an example, an A.C. gearmotor having an output speed of 3 R.P.M. is used. The motor operates from a 120 V/60 Hz power supply. Alternatively, the electric motor receives power from sources such as battery cells, solar cells, or a generator.

[0034] In one embodiment, the motor and receiver assembly 400 includes a control attached to the grill 100. Alternatively or additionally, the motor and receiver assembly 400 receives signals from a remote control. For example, a hand-held, battery-powered transmitter sends signals to a receiver instructing the motor to raise or lower the cover 102. In one embodiment, the transmitter sends a start signal to start the motor and a stop signal to stop the motor. Alternatively, the transmitter sends a single signal to toggle the motor on and off. In one example, both the start signal and the stop signal are initiated by pressing the same button. In another example, the transmitter includes buttons for sending a start signal and a stop signal.

[0035] Alternatively, the transmitter sends a signal when a user activates a control, and continues transmitting the signal until the user releases the control. Thus, the motor continues to operate while it receives a signal from the transmitter.

[0036] The motor rotates the coupling arm 300 clockwise or counter-clockwise. In another embodiment, the motor rotates the coupling arm 300 in a single direction.

[0037] The remote control may also include buttons for controlling the flow of propane in a gas grill.

[0038] One example of a remote control suitable for controlling the cover is a wireless RF remote-control having an on/off switch. The remote uses a 12 volt battery and operates at 312 MHz. The remote is capable of transmitting over 50 feet to a receiver attached to the grill 100. The receiver uses a 120 V power supply and also operates at 312 MHz. The receiver has an output of 120 V AC, and can handle a motor load of 1/3 HP.

[0039] FIG. 5 illustrates a motor mount stabilizer 500 for supporting the motor and receiver assembly 400. The motor mount stabilizer is designed for attachment to a large number of commercially available barbecue grills. As an example, the stabilizer 500 is attached to an existing barbecue cart frame using an adjustable crossbar support arm 600. While not required, the mass of the motor may be balanced over the adjustable crossbar support arm 600. As shown, the exemplary stabilizer illustration includes crossbar attachment plates 502 for attachment to the adjustable crossbar support arm 600. The crossbar attachment plates 502 may be located at the end of the upper portion of the motor mount stabilizer 500. Alternatively, the crossbar attachment plates 502 are located at the center of the upper portion of the motor mount stabilizer 500. In another example, the crossbar attachment plates 502 are located directly above frame attachment plates 506. In one embodiment, crossbar attachment plates 502 and frame attachment plates 506 include holes 504 and 506, respectively, for inserting a bolt or pin. Alternatively, the crossbar attachment plates 502 and frame attachment plates 506 include threaded openings for insertion of a thumbscrew. The thumbscrew may then be tightened for attachment of the motor mount stabilizer 500 to the cooking apparatus 100.

[0040] FIG. 6 shows one embodiment of an adjustable crossbar support arm 600. The crossbar support arm 600 is designed to be attached to an existing barbecue without any modification to the barbecue frame or chassis. A retractable portion 610 allows the adjustable crossbar support arm 600 to fit a large number of preexisting barbecue units. The support arm 600 may be attached to the cooking apparatus 100 by bolting attachment plates

604 to the base or side supports of the cooking apparatus 100. Alternatively, the support arm 600 may be attached to the cooking apparatus 100 by tightening thumbscrews through attachment plates 604 to the base or side supports of the cooking apparatus 100.

[0041] FIG. 6A shows another embodiment of an adjustable crossbar support arm 640. A spring member 634 places pressure on a retractable member 630 and a stationary member 632. In one embodiment the spring member 634 provides sufficient pressure to prevent the attachment plates from disengaging from the grill. In another embodiment, the support arm 630 is attached to the cooking apparatus 100 by bolting attachment plates 604 to the base or side supports of the cooking apparatus 100. Alternatively, the support arm 600 may be attached to the cooking apparatus 100 by tightening thumbscrews through attachment plates 604 to the base or side supports of the cooking apparatus 100. FIG. 6B shows a crossbar support arm 640 having a pin 636 at the end for inserting into a hole in the grill.

[0042] FIG. 6C shows yet another embodiment of an adjustable crossbar support arm 660. A retractable member 650 utilizes a threaded portion 662 to mate with a threaded portion 658 of a stationary member 656. The length of the support arm 100 is controlled by rotating the retractable member 650. In this embodiment, the support arm 100 is attached to the cooking apparatus 100 by inserting pins 654 through a hole in the base of the cooking apparatus. In the illustrated example, the pins 654 include threaded portions 652, that mates with a nut for securing the support arm to the cooking apparatus.

[0043] FIG. 6D shows an embodiment of an adjustable crossbar support arm 682 where the length of the support arm 682 is determined by inserting a pin 674 through one of a plurality of holes. The support arm 682 has a larger member 680 with a plurality of holes 672, and a smaller member 670 with a hole 676 for inserting the pin. Alternatively, the smaller member 670 has a plurality of holes for selecting the length of the support arm 682.

[0044] Alternatively, the motor support arm may be attached to the cooking apparatus through a variety of ways such as hooks, cotter pins, or adhesives.

[0045] FIG. 7 shows a detailed view of the counterweight 700 with cover connectors 702 and coupling rod connector 704. In one embodiment, the counterweight 700 is connected to the lower rear portion of the cover 102. In another embodiment, the counterweight 700 is connected to the upper rear portion of the cover 102. In one

embodiment, the cover connectors 702 extend horizontally from the counterweight 700 to the cover 102. In one embodiment, the cover connectors 702 extend at an angle from the counterweight 700. In one embodiment, the counterweight 700 is attached directly to the cover 102.

[0046] The mass of the counterweight 700 may vary. Some of the factors to consider when selecting the mass of the counterweight 700 include the mass of the cover 102, the distance of the counterweight 700 from the pivot point 104, and the power of the motor and motor receiver assembly 400. In one embodiment, the force of gravity acting on the counterweight 700 at the pivot point is equivalent to the force of gravity acting on the cover 102. Alternatively, the force of gravity acting on the counterweight 700 at the pivot point may be greater or less than the force of gravity acting on the cover 102. In another example, the coupling rod 200 is attached directly to the cover 102 without the use of a counterweight 700.

[0047] The foregoing description has been presented by way of example only, and should not be read in a limiting sense. Although this invention has been described in terms of certain preferred embodiments, other embodiments that are apparent to those of ordinary skill in the art, including embodiments that do not provide all of the benefits and features set forth herein, are also within the scope of this invention. Accordingly, the scope of the present invention is defined only by reference to the appended claims.